June 18, 2014

Mr. Gary Miller
Remedial Project Manager
U.S. Environmental Protection Agency
Fountain Place 12th Floor, Suite 1200
1445 Ross Avenue
Dallas, Texas 75202-2733

RE: GBF/HARC comments on San Jacinto River Waste Pits for the NRRB

Dear Mr. Miller:

Thank you for this opportunity to provide input to the review committee as they evaluate the alternatives for the final remedy for the San Jacinto River Waste Pits Superfund Site. Based on our review we would like to provide the following information for your consideration.

NORTHERN IMPOUNDMENTS

While the cap that was constructed under the removal action was highly effective in the short term in stopping the continued release of source material into the environment, it is an inappropriate long-term solution, because it does not meet the criteria for overall protection, long-term effectiveness, or community acceptance. Based on U.S. EPA's *Guidance for In-Situ Subaqueous Capping of Contaminated Sediments*, we are concerned about the ability to maintain the long-term physical integrity of the cap in this highly dynamic environment. In particular we are concerned that the effects of the weather, including floods, hurricanes and associated storm surge and hurricane wind-driven waves have not been adequately considered. Additionally, this is a highly used river, and the ability of the RPs to enforce use restrictions necessary to protect the integrity of an in-situ cap is limited.

Site-Specific Considerations

Guidance for In-Situ Subaqueous Capping of Contaminated Sediments states that "Low energy environments in protected harbors, low flow streams, or estuarine systems are more appropriate for in-situ capping projects than waterways with high flows since the long-term integrity of the cap will be of less concern and less extensive armoring (or none) will be required…However, armoring techniques or selection of erosion resistant capping materials may make capping technically feasible in some higher energy environments as well, **recognizing that risks increase,**"(emphasis added). The San Jacinto River is clearly in this higher risk category. For example, as stated in the Feasibility Study (FS), "The Armored Cap was designed to withstand a 100-year storm event with an additional factor of safety to ensure its long-term protectiveness." However, a 10-year storm in July 2012 resulted in rock being swept away and exposing the membrane. Although additional waste material was not released during this event, it does highlight the inherent uncertainties in this type of modeling, and the elevated risks to cap

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integrity. Another example of this concern is that in the FS, Appendix A, Figure 2-6, "Spatial Distribution of Predicted Net Erosion During 100-Year Flood", shows that RPs model predicts no more than 25 cm (about 10 inches) of scour in an area, where when subjected to an actual 100-year flood in 1994, experienced 10 to 12-**feet** of scour (in an area just south of the I-10 bridge).[1] Clearly this is a high energy environment that has risks that have been underestimated.

Regarding the 1994 flood, the NTSB report states (p. 2) that: "By any measure, the flooding of October 1994 was an extreme and dangerous event. Historical peak stream flows were exceeded at 23 of the 43 stations monitored in the area. The 100-year-flood, which is defined as the peak stream flow having a 1 percent chance of being equaled or exceeded in any given year, was equaled at 1 and exceeded at 18 of 43 stations. For those stations where the 100- year-flood was exceeded, the flood was from 1.1 to 2.9 times the 100-year-flood. The flooding caused major soil erosion in the flood plain and river channel, including the creation of water channels outside the San Jacinto River bed. The flood waters scoured the riverbed and banks, destabilized roads and bridges, and inundated area homes. The largest new channel (approximately 510 feet wide and 15 feet deep) was created when the river cut through the Banana Bend oxbow just west of the Rio Villa Park subdivision. A second major channel cut through Banana Bend just north of the channel through the oxbow. Both these channels cut through areas where sand mining had been performed previously." Sand mining took place in areas of the pits. Of additional concern is the steep angle of the rock on the northwest corner of the pits where it was not possible to install the geotextile liner. Unexpected scour in this area could result in the release of waste material.

The concerns about being able to adequately predict scour and wave damage is of particular concern in an area that relatively frequently experiences hurricanes (on average every 7 years). As stated in the Guidance Document, on page A-1, "Factors pertinent to flood flows, navigation effects, and wind wave induced currents are presented and then formulas and sample calculations are provided. Less predictable forces on ISC (in-site capping) such as scouring from ice and debris flow from velocities generated by channel blockages such as ice dams, or massive bank failure are not evaluated by this analysis. Designers of ISC should consider the significance of these forces and potential effects in the evaluation of the feasibility of ISC… " While not subject to scouring from ice or ice dams, the area is subject to significant storm surge and hurricane wind-driven waves. The Rice University Severe Storm Prediction, Education and Evacuation from Disasters (SPEED) Center, in conjunction with the University of Houston has done modeling on storm surge in the area. As part of their modeling on the vulnerability of the Houston Ship Channel, they predicted that if Hurricane Ike, a category 2 storm, had higher wind speeds and made landfall just 30 miles west of where it actually came ashore, it would have generated a 25 foot storm surge that would have extended up the San Jacinto River past the area of the Northern Impoundments.[2] The effects of this type of an event need to be considered when evaluating the appropriateness of an armored cap as a long-term solution.

Additionally, we have concerns about the 100-year and 500-year storm events that are the basis of the modeling. These are not events that only happen every 100 or 500 years (as was recently

[1] NTSB Report, Page 34
[2] Severe Storm Prediction, Education and Evacuation from Disasters Center. 2013. Hurricane Ike Struck 5 Years Ago: Are We Ready for the Next Big Storm? http://sspeed.rice.edu/sspeed/downloads/Gate_Solution_2013.pdf (Accessed 1 May 2014).

made obvious when there were 2 "500-year" events in the Midwest in a span of 15 years [1993 and 1998]). Instead, it means that there is a 1% or 0.2% chance (depending on the 100-year vs. 500 year design) in any given year that there will be a storm of sufficient magnitude that the cap could be damaged. But, because those numbers are based on historical data, the actual risk is likely much higher. This location in a major river along the Texas gulf coast is subject to both hurricanes and is likely going to experience increasing extreme flooding and weather events because of the effects of climate change. This challenge is clearly recognized in the transportation sector in the US. For example, as the US EPA wrote on the climate change impact on transportation:

> *In the United States, transportation systems are designed to withstand local weather and climate. Transportation engineers typically refer to historical records of climate, especially extreme weather events, when designing transportation systems. For example, bridges are often designed to withstand storms that have a probability of occurring only once or twice every 100 years.* ***However, due to climate change, historical climate is no longer a reliable predictor of future impacts****. Climate change is projected to increase the frequency and intensity of extreme weather events. Specifically, heat waves will likely be more severe, sea level rise could amplify storm surges in coastal areas, and storms will likely be more intense. [2]* ***These changes could increase the risk of*** *delays, disruptions,* ***damage, and failure*** *across our land-based, air, and marine transportation systems.*[3] (emphasis added)

It is reasonable to assume that these challenges that face our coastal transportation systems will also be faced by an engineered cap in a river along the Texas gulf coast. Other sources have noted a similar issue:

- "The low-lying flat land along the Gulf Coast, skirting the subtropical waters of the Gulf of Mexico, makes the region vulnerable to major hurricanes, **more so than any other region in the United States**."[4] (emphasis added)
- "An increase in average sea level of up to 2 feet or more and the likelihood of increased hurricane intensity and associated storm surge are likely to be among the most costly consequences of climate change for this region…Compared to the present coastal situation, for which vulnerability is quite high, an increase in hurricane intensity…is very likely to increase inland and coastal flooding, coastal erosion rates, [and] also pose a severe risk to people, personal property, and public infrastructure in the Southeast, and this risk is likely to be exacerbated."[5]

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[3] http://www.epa.gov/climatechange/impacts-adaptation/transportation.html (accessed 1 May 2014)
[4] National Research Council of the National Academies, Committee on Climate Change and U.S. Transportation Transportation Research Board Division on Earth and Life Studies. 2008. Potential Impacts of Climate Change on U.S. Transportation. Transportation Research Board Special Report 290 http://onlinepubs.trb.org/onlinepubs/sr/sr290.pdf (Accessed 1 May 2014)
[5] Global Climate Change Impacts in the United States. 2009 http://nca2009.globalchange.gov/southeast (Accessed 1 May 2014)

- "If the Earth's atmosphere warms within the range projected by the Intergovernmental Panel on Climate Change (IPCC, 2001) during the 21st century, the climate of the northern Gulf of Mexico coastline (hereafter, Gulf Coast) and the Mississippi River Deltaic Plain will likely become warmer, with more frequent or prolonged periods of heavy rainfall and drought. These climatic changes would have significant impacts on water quality, flooding, soil moisture, runoff, and many other environmental factors... Seasonal rainfall and hurricane frequency in the Gulf Coast region have been linked with El Niño and La Niña events, which may become more intense as the Earth's atmosphere warms. The anticipated increase in global average temperature will accelerate sea-level rise, which can lead to increased vulnerability of transportation infrastructure to storm damage and flooding in low-lying coastal zones. "[6]

Therefore, "100-year" and "500-year" events are likely to have an increasing effect on the region, and potential damage related to sea level rise (up to 2 feet), storm surge (up to 25 feet) and cresting waves all need to be considered when evaluating the long-term effectiveness of capping in this location. As stated in the EPA guidance document, "Finally, when comparing ISC with other remedial alternatives, there is an element of cap design that should be considered. The part of ISC design that addresses the susceptibility of the cap to erosion must consider forces that are highly dynamic (i.e. river flows, propeller wash, wave heights, etc.). ISC design analyses contain probabilistic factors that are not commonly present in the design of treatment or confined disposal alternatives." The guidance document continues, noting that bottom currents could potentially cause resuspension and erosion of the cap, thus "the effects of storm-induced waves or other episodic events such as flood flows on bottom current velocities must also be considered."[7]

Another concern is the ongoing use of the river. The site is in a highly-used channel and there are concerns both of protecting cap integrity and protecting future use of the waterway. As noted in the guidance document, "For instance, the locations of water supply intakes, stormwater or effluent discharge outfalls, utility crossings, and the construction of bulkheads, piers, docks and other waterfront structures would have to be evaluated with consideration of their potential impacts on cap integrity and maintenance... The ability to enforce use restrictions necessary to protect the integrity of an in-situ cap (e.g., vessel size limits, bans on anchoring, etc.) is an area with little or no operating experience. Voluntary restrictions on uses of public lands and waters are often ineffective. **Compliance, enforcement, and the effectiveness of these measures as well as the consequences of non-compliance on ISC should be considered**." (emphasis added). Effects of proposed changes such as what the proposed Centennial Gate, which would dam the Houston Ship Channel during a storm surge, should also be evaluated as a possible future development that could affect flow in the San Jacinto River during storm events.

[6] Burkett, V. Potential Impacts of Climate Change and Variability on Transportation in the Gulf Coast/Mississippi Delta Regionhttp://climate.dot.gov/documents/workshop1002/burkett.pdf (Accessed 1 May 2014)
[7] US EPA. 2012. Guidance for In-Situ Subaqueous Capping of Contaminated Sediments. http://www.epa.gov/glnpo/sediment/iscmain/two.html (Accessed 1 May 2014)

Northern Impoundments Conclusions

While we appreciate that there is a risk of release of waste material during any sort of construction at the site, we believe that the releases will be minimal if appropriate control measures are taken. Complete removal of all the wastes, removal of wastes with dioxin concentrations that exceed the protective concentration level, or stabilizing/solidifying the waste would help reduce the long term risk of release of dioxin in the event of a cap failure. Of these options, complete removal of the wastes would provide the greatest long-term reduction of risk to human and environmental health.

SOUTHERN IMPOUNDMENT

The Draft Final FS States "Three dioxin and furan source types have been identified in soils of the area of investigation south of I-10, only one of which has a fingerprint that is similar to the paper mill wastes contained in the North Impoundments." It is clear that by this statement the PRPs are explaining that it is highly unlikely that all of the waste is related to the former actions of the companies associated with their liability. However, given the joint and several liability component of CERCLA, clearly the relevant fact is that one of the sources did have a fingerprint similar to paper mill wastes; therefore, the PRPs are responsible for implementing a solution that is appropriately protective to human health and the environment, regardless of the presence of other material and in particular lacking any other identified PRPs. That said, based on the nature and extent of contamination in the area, institutional controls are a reasonable response. Our only concern is that the PRPs do not own or control the property, potentially making it challenging for them to enforce the restrictions on excavation.

The Galveston Bay Foundation, HARC, and the community appreciate this opportunity to provide the EPA comments on the Feasibility Study. Thank you for all your efforts to protect the community. If you have any questions or comments, please do not hesitate to contact Mr. Scott Jones at (281) 332-3381 x209 and sjones@galvbay.org or Ms. Jennifer Ronk at (414) 331-5570 and jronk@HARCResearch.org.

Sincerely,

Scott A. Jones
Director of Advocacy
The Galveston Bay Foundation

Jennifer J. Ronk, PG, CEM, PMP
Program Director Environmental Science and Energy Efficiency
HARC